

IN THE CLAIMS

Please amend the claims as follows:

1. (original) An image processing apparatus (1) for the reconstruction of time-dependent representations $I(x,t)$ of an object (2), comprising
 - an approximation module with memory storing the
N-dimensional parameter vector $a(x)$ of a
predetermined parametric model function $I^*(a(x),t)$
that approximates the function $I(x,t)$;
 - an input module for the reception of a set of projections
 p_j^i of the object (2) generated at times t_j^i , and
 - an estimation module that is adapted to estimate the
parameter vector $a(x)$ with the help of said
projections p_j^i .
2. (original) An apparatus according to claim 1, characterized in that it comprises an evaluation module for the determination of a perfusion map from the representation $I^*(a(x),t)$ of a vessel system.
3. (original) An apparatus according to claim 1, characterized in that the representation $I(x,t)$ and its approximation $I^*(a(x),t)$

describe for each time t a cross-sectional image of the object.

4. (original) An apparatus according to claim 3, characterized in that the estimation of the parameter vector $a(x)$ is based on the update function $\Delta I(x, p^{i(k)}, I^k(x))$ of an iterative algorithm for the reconstruction of a stationary cross-sectional image $I(x)$, wherein $p^{i(k)}$ is a projection used in the k -th iteration step and $I^k(x)$ is the k -th estimate for $I(x)$.

5. (original) An apparatus according to claim 4, characterized in that the parameter vector $a(x)$ is iteratively approximated by a sequence $a^k(x)$, wherein the $(k+1)$ -th iteration comprises the following steps:

a) computation of estimates $I^*(a^k(x), t_{ij}^i)$ for at least N of the times t_{ij}^i , wherein $i \in A$ and $j \in B$ for some index sets A, B ;

b) computation of corresponding updates $\Delta I^{k,i_j} = \Delta I(x, p_{ij}^i, I^*(a^k(x), t_{ij}^i))$

with the help of said estimates $I^*(a^k(x), t_{ij}^i)$ and the measured projections p_{ij}^i that correspond to the times t_{ij}^i ;

c) calculation of the new estimate $a^{k+1}(x)$ for the parameter vector $a(x)$ by minimising

$$\chi^2(x) = \sum_{i \in A, j \in B} \left(I^*(\underline{a}^{k+1}(x), t_{ij}^i) - I^*(\underline{a}^k(x), t_{ij}^i) - \Delta I^{k,i}_j(x) \right)^2.$$

6. (original) An apparatus according to claim 1, characterized in that the set of measured projections p_{ij}^i can be divided into M subsets, wherein each subset comprises only projections p_{ij}^i , $j = 1, \dots, Q$ taken from the same or approximately the same direction (d^i) at different times t_{ij}^i , and wherein $Q \geq N$.

7. (original) An apparatus according to claim 1, characterized in that the estimation of the parameter vector $a(x)$ is based on the minimization of an objective function evaluating the deviation between the measured projections p_{ij}^i and corresponding projections $P_i I^*(a^k(x), t_{ij}^i)$ calculated from the model function, wherein the objective function preferably is defined as

$$\chi^2 = \sum_{i,j} \left(p_{ij}^i - P_i I^*(\underline{a}(x), t_{ij}^i) \right)^2.$$

8. (original) An apparatus according to claim 1, characterized in that the estimation of the parameter vector $a(x)$ makes use of an anatomical reference data set.

9. (original) An X-ray examination system, comprising
- a rotational X-ray apparatus (3) for generating X-ray projections p_j^i of an object (2) from different directions;
 - an image processing apparatus (1) coupled to the X-ray apparatus (3) and adapted to estimate based on said projections p_j^i the N-dimensional parameter vector $a(x)$ of a predetermined model function $I^*(a(x), t)$ that approximates the representation $I(x, t)$ of the object (2).

10. (currently amended) The system according to claim 9, characterized by an image processing apparatus (1) ~~according to one of claims 1 to 8~~ for the reconstruction of time-dependent representations $I(x, t)$ of an object (2), comprising
- an approximation module with memory storing the
N-dimensional parameter vector $a(x)$ of a
predetermined parametric model function $I^*(a(x), t)$
that approximates the function $I(x, t)$;
 - an input module for the reception of a set of projections
 p_j^i of the object (2) generated at times t_j^i , and
 - an estimation module that is adapted to estimate the

parameter vector $a(x)$ with the help of said projections $p_{j_1}^i$.

11. (original) The system according to claim 9, characterized in that the rotational X-ray apparatus is a C-arm system (3) or a multi-slice CT system.

12. (original) The system according to claim 9, comprising an injection system for injecting a contrast agent into the blood flow of a patient.

13. (original) A method for the reconstruction of time-dependent representations of an object (2), comprising the following steps:

- approximation of the function $I(x,t)$ which describes the representations by a predetermined parametric model function $I^*(a(x),t)$; and
- estimation of the N-dimensional parameter vector $a(x)$ with the help of a set of projections $p_{j_1}^i$ of the object (2) generated at times $t_{j_1}^i$.

14. (original) The method according to claim 13, characterized in that the projections $p_{j_1}^i$ are generated with a C-arm system (3) or a multi-slice CT system.

15. (original) A computer program for enabling carrying out a method according to claim 14.

16. (original) A record carrier on which a computer program according to claim 15 is stored.

17. (original) An X-ray system suitable for determining a 3D dynamic process in an object (2), the system comprising

an x-ray source and an x-ray detector placed at opposite positions with respect to an examination space and simultaneously rotatable around said examination space for generating a plurality of x-ray projections;

a data processing unit for deriving from said plurality of x-ray projections a map of the time dependent 3D dynamic process in the object (2);

whereby the 3D dynamic process is approximated by a predetermined model with a limited set of parameters;

whereby the data processing unit is arranged to estimate parameters in said limited set of parameters out of data in the x-ray projections.

18. (original) The X-ray system according to claim 17, whereby the predetermined model approximates the perfusion of contrast medium in tissue.

19. (original) The X-ray system according to claim 17, whereby the x-ray system is a C-arm x-ray device or a multi-slice CT system.